

## Glossary

**Abiogenesis** | The study of how life could emerge from nonliving matter.

**Absorption Lines** | Discrete wavelengths of Electromagnetic radiation that are removed from a continuous spectrum as photons are absorbed by an atom's elections.

**Acceleration** | The rate change of a velocity in magnitude and/or direction.

**Adaptive Optics** | A system that corrects for atmospheric distortion by deforming the mirror in a reflecting telescope.

**Altitude** | The measure in degrees of an object's position above the horizon.

**Amplitude** | The maximum height of a wave's crest.

**Angular Momentum** | The measure of an object's rotational motion.

**Angular Size** | The apparent size in degrees of an object in the sky.

**Annular Eclipse** | A solar eclipse in which the Moon's shadow is smaller than the Sun's angular size, resulting in a ring surrounding the Moon's shadow.

**Antikythera Mechanism** | A brass artifact that was used by the ancient Greeks for navigation and to calculate the position of the Moon, the planets, and stars for any given date.

**Aphelion** | The point in a planet's orbit that is furthest from the Sun.

**Apollo Asteroid** | An asteroid whose orbit crosses the Earth's orbital path.

**Archeoastronomy** | The study of astronomical practices of ancient peoples.

**Asteroid** | A small, rocky body in the solar system.

**Asthenosphere** | The uppermost region of Earth's mantle, consider of very soft or melted rock.

**Astrobiology** | The study of the origin, evolution, and future of life in the universe.

**Atmospheric Probe** | A probe that enters in the atmosphere of a planet or moon to gather data about the atmosphere.

**Atom** | The smallest particle that still possesses the chemical properties of an element.

**Atomic Mass** | The number of protons and neutrons in the nucleus of an atom

**Atomic Number** | The number of protons in the nucleus of an atom.

**Aurorae (Northern and Southern Lights)** | Currents of lights produced when charged particles interact with the atmosphere near the poles.

**Autumnal Equinox** | 1. One of two days in which the Sun's path across the sky intersects the celestial equator. 2. The first official day of autumn.

**Azimuth** | The measure in degrees of an object's position east or west of the celestial meridian.

**Black Body** | A hypothetical object whose thermal radiation is dependent only on its temperature.

**Blueshift** | The shortening of the wavelength of electromagnetic radiation caused by a source moving towards the observer.

**Bright Zone** | A light colored band on a gas giant where warm, light gases rise.

**Celestial Equator** | An imaginary circle produced by project the Earth's equator onto the celestial sphere.

**Celestial Meridian** | An imaginary arc running across the sky, connecting north and south points and passing through the zenith.

**Celestial Sphere** | An imaginary sphere surrounding the Earth in which the stars are embedded on its inner surface. Astronomers use the celestial sphere model to locate objects in the sky.

**Center of Mass** | A point in a system in which can be treated as if all of the mass were concentrated at that point. According to Newton's law of gravity, the Sun and a planet orbit around their common center of mass.

**Charged Couple Device** | An electronic device that converts the light from an image into an digital electronic signal.

**Chirality** | The "handedness" of certain molecules which are mirror images of each other.

**Chlorofluorocarbons (CFCs)** | A class of chemicals whose production has been phased out due to the effect they have on the ozone layer.

**Chromatic Aberration** | A rainbow-colored halo that forms around images due to different wavelengths of light being bent at slightly different angles by the lens of a refracting telescope.

**Chromosphere** | The slightly cooler region of the solar atmosphere above the photosphere.

**Circum-Pacific Belt (Ring of Fire)** | An arc of subduction boundaries and transform boundaries around the edge of the Pacific Ocean where 90% if Earth's volcanic eruptions and earthquakes occur.

**Comet** | A body of ice and rock originating in the Oort cloud.

**Compound** | A molecule consisting of atoms from two or more different elements.

**Conduction** | The transmission of heat through physical contact.

**Constellation** | Apparent groupings of stars in the night sky that astronomers use as convenient markers for location objects in the sky.

**Constructive Interference** | Interference between two waves that results in a magnification of their amplitudes, producing higher crests and deeper troughs.

**Control Group** | A group of experimental subjects in which the independent is not change. The control group is used as a point of comparison to the treatment group.

**Convection** | The transportation of heat through the movement of fluids.

**Convection Cells** | Regions in the troposphere where convection currents where warm, moist air rises and cooler, dry air sinks.

**Convection Zone** | Region in the solar interior where energy is primarily transported by convection.

**Convergent Plate Boundary** | A boundar where two tectonic plates are coming together.

**Core** | The central region of a planet or star.

**Corona** | The hot, outermost region of the solar atmosphere.

**Coronal Mass Ejection** | A large blob of hot plasma with a strong magnetic field ejected from the Sun.

**Cosmic Rays** | Charged particles from deep space.

**Cosmology** | The view and understanding of the universe.

**Crater** | A depression in the surface of a planet, moon, or asteroid resulting from an impact with another object.

**Crest** | The point of highest displacement in a wave's motion.

**Crust** | The outmost layer of Earth, consisting of low-density, brittle rock.

**CubeSats** | Small, light weight satellites used for low cost missions.

**Dark Belt** | A darker band on a gas giant where cooler gas is sinking.

**Data** | Numerical information collected during an experiment.

**Daughter Product** | The atom produces by certain nuclear reactions such as radioactive decay or nuclear fusion.

**Declination** | The measure in degrees of an object's position north or south of the celestial equator.

**Deferent** | A circular path around the Earth in a geocentric model.

**Dependent Variable** | A condition that changed in response to changing an independent variable and is measured during an experiment.

**Destructive Interference** | Interference between two waves that results in the dampening of the waves' amplitudes, producing smaller crests and troughs.

**Deuteron** | A particle consisting of one proton and one neutron.

**Diffraction** | The bending of a wave front around a barrier.

**Diffraction Limit** | The limit of a telescope's resolving power.

**Dissociation** | The separating of the atoms in a molecule.

**Divergent Plate Boundary** | A boundary where to tectonic plates are pushed apart by magma rising from the asthenosphere.

**Doppler Effect** | The change in frequency of a wave caused by the relative motion of the source and the observer.

**Drake Equation** | A series of estimates of factors that must be present for a technological civilization to survive. Used to estimate the number of civilizations in the galaxy.

**Dwarf Planet** | An object orbiting a star in an elliptical orbit with sufficient mass for gravity to force it into a spherical shape but not even mass to have cleared its orbital path of similar-sized objects.

**Dynamo Effect** | A effect produced by a rotating, molten conductor that produces a magnetic field.

**Ecliptic** | 1. An imaginary arc tracing the Sun's apparent motion across the sky. 2. The plane of the Earth's orbit around the Sun.

**Electromagnetic Radiation** | The transmission of energy through space by varying electric and magnetic field.

**Electromagnetism** | The force of attraction/repulsion between charged particles. Electromagnetism governs chemical bonds between atoms, electromagnetic radiation, electric fields, and magnetic fields.

**Electron** | An atomic particle that orbits around the nucleus of an atom and possesses a negative electric charge.

**Element** | A substance that cannot be chemically broken down into other substances and consists of atoms that all have the same atomic number.

**Ellipse** | A curve consisting of all points the sum of whose distances from two foci equal a constant.

**Emission lines** | Discrete wavelengths of electromagnetic radiation produced when an atom's electrons drop from a higher energy state to a lower one by the emission of a photon.

**Energy** | The intangible phenomenon which can change in an object's motion, temperature, or chemical phase; the capacity to do work.

**Entropy** | The measure of disorder in a system.

**Epicycle** | A circle the moves around the edge of a deferent in a geocentric model.

**Equant** | The central point in Ptolemy's cosmology in which all the objects in the universe revolve around it and the Earth is located slightly off-center from the equant.

**Equinox** | A day when the number of night time hours equals the day light hours.

**Erosion** | The weathering away and transport of particulate matter.

**Escape Velocity** | The velocity an object must achieve in order to escape a planet's gravity and travel out into the Solar System.

**Exoplanet** | A planet orbiting a star other than the Sun.

**Extremophiles** | Organisms that can survive in environmental conditions (temperature, salinity, radiation) that are too "extreme" for what most other organisms on Earth can tolerate.

**Extrusive (Volcanic) Rock** | A rock that formed when lava cooled on the surface.

**Fermi Paradox** | The Lack of Evidence of extraterrestrial life despite the fact that mathematically, there should be numerous alien civilizations.

**Flyby** | A spacecraft mission in which a probe passes close to a planet to gather data and while it continues on its path.

**Force** | Any phenomenon that produces an acceleration in an object's motion.

**Fossil** | An imprint of or the lithified remains of a deceased organism left in sedimentary rocks.

**Free Fall** | Falling in response to no forces other than gravity.

**Frequency** | The number of wave crests that pass a specific point per second.

**Frost Line** | An imaginary line in the Solar System, inside of which it was too hot for water to condense into ice crystals during the Solar System's early formation.

**Galilean Moons** | The four largest of Jupiter's moons: Io, Europa, Callisto, and Ganymede, that were discovered by Galileo.

**Gas Giant** | A large Jovian planet consisting mostly of hydrogen and helium.

**Geocentrism** | A cosmological view that places the Earth at the center of the universe and all other objects, including the stars, the planets, the Sun, and the Moon revolve around it.

**Geostationary Equatorial Orbit** | An orbit in which the satellite remains over a fixed point above the equator.

**Gravitational Lensing** | The bending of the path of electromagnetic wave in response to the warping of spacetime due to a strong gravitational force.

**Gravity** | A force produced by the mass of an object. Every object with mass exerts a gravitational attraction on every other object.

**Gravity Assist** | A maneuver that uses the gravity of a planet to increase or decrease the velocity of a spacecraft.

**Greenhouse Effect** | The ability of certain gases in the atmosphere to trap heat energy in the troposphere, making the surface warmer than it otherwise would be.

**Habitable Zone** | Regional zone around a star in which a planet could have temperatures that support life as we know it.

**Half-life** | The amount of time it takes half of a given quantity of a radioactive isotope to undergo radioactive decay.

**Heat Death of the Universe** | The point in the future where the entire universe reaches maximum entropy and there will no longer be any energy available to do work.

**Heliocentrism** | A cosmological view in which all of the planets revolve around the Sun.

**Heliopause** | The boundary between the influence of the Sun's magnetosphere and the magnetic field of the galaxy.

**Hohmann Transfer Orbit** | An elliptical orbit that carries a probe from one planet to another in the most fuel efficient manner.

**Horizon** | The line where the Earth's surface appears to meet the sky. All points located 90 degrees from the zenith.

**Hot Jupiter** | A gas giant exoplanet orbiting very close to its companion star.

**Hydroponics** | The growing of plants in water without soil.

**Hypothesis** | A possible explanation for a phenomenon that can be subjected to testing through the scientific method.

**Ice** | Compounds which have relatively low freezing temperatures, such as water, methane, and ammonia.

**Ice Giant** | Jovian planets that contain large quantities of ices.

**Igneous Rock** | A rock that forms when magma cools and solidifies.

**Impactor** | A probe that gathers data as it is deliberately crashed onto the surface of a planet or moon.

**Interference** | The interaction between two waves.

**Interferometry** | The practice of using multiple telescopes to improve resolving power.

**Intrusive (Plutonic Rock)** | An igneous rock that formed when magma cooled slowly beneath the surface.

**Ion Engine** | A propulsion system that produces thrust by heating up a gas into a plasma state and ejecting charged particles.

**Ionosphere** | The uppermost region of Earth's atmosphere where gases are ionized by solar radiation

**Iron-Sulfide World Hypothesis** | The hypothesis of the origin of life in which life originated in hydrothermal vents on the ocean floor.

**Isomers** | Molecules that have the same chemical formula but are mirror images of each other, i.e., they have opposite handedness or chirality.

**Isotope** | An atom of the same element but has a different atomic mass, i.e., a different number of neutrons.

**Jovian Planet** | A large planet consisting mostly of gas or icy materials that lacks a solid surface.

**Kepler's Laws** | Three laws that describe the orbit motion of planets around the Sun as ellipses.

**Kinetic Energy** | Energy of motion.

**Kirchoff's Laws** | Laws that describe the emission and absorption of electromagnetic radiation by matter.

**Kuiper Belt** | A region beyond the orbit of Neptune where numerous dwarf planets and other icy/rocky bodies orbit the Sun.

**Kuiper Belt Object** | Any body of ice or rock orbiting in the Kuiper Belt, also known as Trans-Neptunian Objects.

**Lagrange Point** | A point in which the gravity of two bodies where their mutual gravitational attraction produces a zone of stability where objects can maintain the same relative position relative to both bodies.

**Lander** | A probe that lands on the surface of a planet or moon to gather data for an extended period of time.

**Late Heavy Bombardment** | A period between 4.1 and 3.8 billion years ago in which there were numerous planetisms which collided with planets and moons. The period during which most of the Moon's craters formed.

**Latitude** | The measure of degrees north or south of the equator.

**Launch Window** | The period of time when planets make their closest approach, affording the shortest transfer orbit for sending a spacecraft from one planet to another.

**Lava** | Magma that has been released to the surface by a volcano.

**Lava Dome** | Pancake-like formations caused by magma flows that caused the surface to distend and then collapsed when the magma withdrew.

**Laws of Thermodynamics** | The laws that describe the interaction between heat and motion in a system.

**Light-Gathering Power** | The amount of light a telescope's primary mirror or lens can collect.

**Lithosphere** | The uppermost portion of Earth's mantle combined with the crust.

**Long Period Comet** | A comet with an orbital period greater than 200 years.

**Longitude** | The measure of degrees east or west of the prime meridian.

**Longitudinal Wave** | A wave in which the motion of the medium is parallel to the motion of the wave front.

**Low Earth Orbit** | An Earth-centered orbit near the planet, often specified as having a period of 128 minutes or less and an eccentricity less than 0.25.

**Luminosity** | The total energy radiated by an object.

**Lunar Eclipse** | An eclipse in which the Moon passes through the Earth's shadow.

**Magma** | The hot, molten form of rock.

**Magnetic Sail** | A electrically charged propulsion system that uses the solar wind to generate thrust.

**Magnetosphere** | The region surrounding a planet or star dominated by its magnetic field.

**Manipulative Experiment** | An experiment in which the independent variable is changed in a laboratory.

**Mantle** | A thick layer of soft, low density rock between the Earth's core and its crust.

**Maria** | Large, dark and flat areas on the Moon.

**Mass** | The measure of the amount of material substance in an object.

**Maunder Minimum** | A period in the 1600s and 1700s when there was unusually low sunspot activity.

**Megalith** | A large stone structure built by ancient people.

**Mesosphere** | The region of Earth's atmosphere between the stratosphere and the ionosphere.

**Metal** | In astronomy, metals are any elements heavier than hydrogen and helium.

**Metallic Hydrogen** | Hydrogen gas that has been subjected to enough pressure to allow its electrons to move freely, giving it metallic properties, such as being a good conductor of heat and electricity.

**Metamorphic Rock** | A rock whose crystalline structure has been altered by heat and/or pressure.

**Meteor** | A streak of light in the sky caused by a meteoroid enters the atmosphere. Also known as a shooting star.

**Meteor Shower** | A event where numerous meteors fall through the sky at once.

**Meteorite** | A piece of a meteoroid that survives entry in the atmosphere and reaches the ground.

**Meteoroid** | A small rocky body in space, generally smaller than an asteroid.

**Mineral** | An element or compound with a crystalline structure, a specific chemical composition, and distinct set of properties.

**Molecule** | Two or more atoms bonded together.

**Momentum** | The measure of an object's motion.

**Moon** | A rocky or icy body that orbits another planet or dwarf planet.

**Nebula** | An interstellar cloud of gas and dust.

**Nebular Theory** | The model describing the origin of the Solar System as beginning with the collapse of a nebula.

**Neutrino** | Very low mass, weakly interacting subatomic particles produced in nuclear fusion reactions.

**Neutron** | A particle found in the nucleus of an atom that possesses no electric charge.

**Newton's Law of Gravity** | The law describing the gravitational attraction between two objects that possess mass.

**Newton's Laws of Motion** | Three laws describing the motion of object in an inertial frame of reference.

**North Celestial Pole** | An imaginary point in the sky around which all the constellations in the northern hemisphere rotate. For an observer standing on the north pole, the north celestial pole is located directly overhead.

**North Star** | A star known as Polaris that is located close to the celestial north pole and in the constellation Ursa Minor.

**Nuclear Fusion** | The combining of two or more light atomic nuclei into a heavier nucleus.

**Nucleus** | The central mass of an atom containing protons and neutrons.

**Observation Science** | A scientific method of studying large or complicated natural phenomena through making field observations.

**Oort Cloud** | A swarm of cometary bodies in interstellar space that surrounds the Solar System between 2,000 and 200,000 AU from the Sun.

**Orbital Velocity** | The necessary velocity an object must accelerate too in order to leave the surface of a planet and achieve orbit around it.

**Orbiter** | A probe that travels to another planet and places itself in orbit to engage in mapping and other extensive observations.

**Ozone Hole** | A portion of the ozone layer located above Antarctica where the concentration of ozone is lower than normal due to the release of CFCs.

**Ozone Layer** | The region in the stratosphere with a high concentration of ozone.

**P-Type Orbit** | An orbit around a binary star system in which the planet orbits very far around both stars.

**Pangaea** | A supercontinent in which all of Earth's land masses were combined that existed between 335 million and 175 million years ago.

**Panspermia** | The hypothesis that life was "seeded" on Earth by asteroids and/or comets delivering microorganisms from space.

**Parallax** | The apparent change in position of objects against a more distant background.

**Partial Eclipse** | An eclipse in which either the Sun or the Moon is only partially covered by a shadow.

**Penumbra** | The lighter, outer region of the Moon's shadow that produces a partial solar eclipse.

**Perihelion** | The point on a planet's orbit that is closest to the Sun.

**Period** | The time between two successive wave crests.

**Photon** | A particle of electromagnetic energy.

**Photosphere** | The visible, granulated region above the Sun's convection zone.

**Planet** | An object that orbits a star in an elliptical orbit that has sufficient mass for gravity to force it into a spherical shape and has cleared its orbital path of any similar-sized objects.

**Planetary Rings** | Formations of millions of particles of ice and rock orbiting around a planet that, from a distance, appear like ringlike structures.

**Plasma** | Gas that has become ionized in which the electrons have been freed from their orbits around the nuclei.

**Plate Tectonics** | The theory that Earth's crust consists of several moving pieces called tectonic plates.

**Polar Molecule** | A molecule which has an uneven distribution of electric charge even though it still is neutral as a whole.

**Positron** | The anti-matter counterpart of the electron which possess a positive electric charge instead of the negative electric charge that an electron has.

**Potential Energy** | Energy of position or that is stored.

**Pressure Waves (P-waves)** | Longitudinal seismic waves.

**Prime Meridian** | An imaginary line running north to south and passing through Greenwich, England.

**Protocells** | Cell-like structures formed by phospholipid molecules coming together into membrane-like formations.

**Proton** | A particle found in the nucleus of an atom that has a positive electric charge.

**Proton-Proton Chain** | The process by which hydrogen nuclei are fused into helium nuclei in the core of the Sun.

**Quantized** | Existing in discrete states instead of a continuum.

**Radiation** | The transmission of heat or energy through space by electromagnetic radiation.

**Radiation Zone** | The region in the solar interior where energy is transported by radiation.

**Radiative Energy** | Energy produced from electromagnetic radiation.

**Radioactive Decay** | The spontaneous transformation of an unstable isotope by emitting particles and/or electromagnetic radiation.

**Radioisotope** | An isotope of an element that is unstable and undergoes radioactive decay.

**Radiometric Dating** | The use of radioactive decay to calculate the age of a rock by measuring the ratio of a radioisotope and its daughter product.

**Redshift** | The increase in the wavelength of electromagnetic radiation caused by source moving away from the observer.

**Reflecting Telescope** | A telescope that uses a curved mirror to gather light from distant objects and produce a magnified image.

**Refracting Telescope** | A telescope that uses a pair of lenses to gather light from distant objects and produce a magnified image.

**Refraction** | The bending of light waves as it passes from one medium to another.

**Regolith** | Dust and pulverized minerals on the surface of a planet or moon left behind by an impact.

**Resolving Power** | The ability to distinguish between two distinct objects.

**Retrograde** | The apparent backward motion of planets against the background stars.

**Right Ascension** | The measure of an object's position in hours, minutes, and seconds from the ecliptic on the vernal equinox.

**RNA World Hypothesis** | The hypothesis of the origin of life in which the first self-replicating molecules were RNA instead of DNA.

**Rock** | A solid aggregation of minerals.

**Rock Cycle** | The heating, cooling, weathering, melting, and reassembling of minerals into different kinds of rocks.

**Rocket** | A projectile propelled by burning solid or liquid fuel.

**Rover** | A lander with wheels or treads, enabling it to travel on the surface of a planet or moon.

**S-Type Orbit** | An orbit around a binary star system in which the planet orbits close to one of the stars.

**Satellite** | A natural or artificial object orbiting another object in space.

**Scalar** | A quantity consisting of a magnitude without any direction.

**Scarps** | Long cliffs on the surface of Mercury that formed as the planet cooled and contracted.

**Scientific Method** | A formalized process of gaining knowledge about the natural world through observation, testing, and analysis.

**Sedimentary Rock** | A rock that formed when sediments are pressed or cemented together.

**Sediments** | Particles of minerals produced when rocks are weathered by wind, water, or other forces.

**Seismic Waves** | Waves that are produced by earthquakes or other seismic activity.

**SETI (Search for Extraterrestrial Life)** | An organized effort to search for signals from extraterrestrial civilizations.

**Shear Waves (S-waves)** | Transverse seismic waves.

**Shepherd Moons** | Moons whose gravity "shepherds" particles in orbit around a planet, keeping them in planetary rings.

**Short Period Comet** | A comet whose orbital period is less than 200 years.

**Sidereal Day** | A measure of the Earth's rotation based on the position of the stars in the sky from one night to the next.

**Sidereal Month** | The amount of time it takes the Moon to make one complete orbit around the Earth.

**Sidereal Year** | The measure of the Earth's orbit around the Sun relative to the constellations.

**Solar Day** | A measure of the Earth's rotation from noon one day to noon on the next.

**Solar Eclipse** | An eclipse in which the Moon passes between the Earth and Sun and blocks the Sun's light.

**Solar Flare** | An explosion on the surface of the Sun that emits X-rays and charged particles.

**Solar Prominence** | A large sheet of ejected gas from the sun that last for several days or weeks.

**Solar Sail** | A propulsion system that using a material with a high surface area to mass ratio and uses light pressure from the Sun's rays to produce thrust.

**South Celestial Pole** | An imaginary point in the sky around with all the constellations in the southern hemisphere rotate. For an observer standing on the south pole is located directly overhead.

**Space Elevator** | A hypothetical means of bringing objects into orbit from the surface by means of a long tether.

**Spectroscope** | A device that can separate light into its component wavelengths.

**Speed** | The rate change of motion of an object.

**Spontaneous Generation** | A now-discredited hypothesis to explain how living cells are spontaneously produced from nonliving matter.

**Stratosphere** | The region of the atmosphere above the troposphere and contains the ozone layer.

**Strong Nuclear Force** | The short-range force that holds quarks together into the protons and neutrons in the nuclei of atoms.

**Subduction** | The sliding of a section of oceanic crust underneath a continental crust at a convergent plate boundary.

**Summer Solstice** | 1. The day on which the Sun's position in the sky at noon on each day stops moving higher in the sky and starts moving down again. 2. The first official day of summer.

**Sunspot** | A dark region on the surface of the sun that is slightly cooler than the surrounding photosphere.

**Superearth** | An exoplanet intermediate in size between that of Earth and Neptune.

**Synodic Month** | The amount of time it takes the Moon to go through a complete set of phases, for example, from full moon to the next full moon.

**Tectonic Plate** | A piece of Earth's crust that moves due to convective forces in the asthenosphere.

**Temperature** | The average kinetic energy in the particles of a system.

**Terraforming** | The altering of a planetary atmosphere and surface to create more Earthlike conditions where Earth like could survive without artificial life support.

**Terrestrial Planet** | A small planet consisting mostly of rocky or metallic material.

**Thermal Energy** | The collective kinetic energy of all the particles in a system.

**Thermal Radiation** | Electromagnetic radiation emitting by the thermal energy of a system.

**Tides** | The twice daily rising and falling of Earth's oceans due to the influence of gravity from the Moon and the Sun.

**Torque** | The produce of force distance the distance from the point of rotation.

**Total Eclipse** | An eclipse in which either the Sun or the Moon is complete covered by a shadow.

**Transform Plate Boundary** | A boundary where two tectonic plates are sliding against each other.

**Transit** | The period in which an exoplanet passes in front of the face of its companion star.

**Transverse Waves** | Waves in which the motion of the medium is perpendicular to the motion of the wave fronts.

**Treatment Group** | A group of experimental subjects in which the independent variable is changed in order measure the change in the dependent variable.

**Trojan Asteroid** | An asteroid in the L4 or L5 Lagrange point of a planet's orbit.

**Tropical Year** | A measure of the Earth's orbit using the seasons, such as from one vernal equinox to the next one.

**Troposphere** | The lowest region of the atmosphere. On Earth, the troposphere ranges from the surface to approximate 13 km above sea level.

**Trough** | The point of lowest displacement in a wave's motion.

**Umbra** | The darker, central region of the Moon's shadow that produces a total solar eclipse.

**Uplift** | The raising up of mountains as two continental plates collide at a convergent plate boundary.

**Van Allen Belts** | Two regions around Earth where charged particles from the solar wind are trapped.

**Vector** | A quantity that consists of both magnitude and direction.

**Velocity** | The rate change of motion of an object in a specific direction.

**Vernal Equinox** | 1. One of two days where the Sun's path across the sky intersects with the celestial equator. 2. The first official day of spring

**Volcanism** | The eruption of molten rock onto the surface.

**Water Hole** | A radiowave frequency ~1.5 GHz where there is little background noise that is a focus by SETI's efforts to look for alien signals.

**Wave** | The transmission of energy through a medium without the transportation of matter.

**Wavelength** | The distance between two successive wave crests.

**Weak Nuclear Force** | The short-range force that governs certain forms of radioactive decay, such as beta decay.

**Weight** | The measure of the gravitational force an object experiences.

**Winter Solstice** | 1. The day on which the Sun's position at noon on each day stops moving lower in the sky and starts moving back up again. 2. The first official day of winter.

**Work** | Any change in an object's position due to an external force.

**Zeeman Effect** | The splitting of spectral lines due to a strong magnetic field.

**Zenith** | The point in the sky directly over head of the observer.

**Zodiac Constellations** | The group of twelve constellations located close to the ecliptic that the Sun appears to "pass through" throughout the course of a year.

**Zonal Flow** | The rising and falling of gases in different colored bands of a gas giant due to differences in temperature.